

INDIAN DRAGONFLIES,

BY

MAJOR F. C. FRASER, I.M.S.

(With Text-figures.)

(Continued from page 932 of Volume XXVI.)

Part VII.

64. *Rhyothemis plutonia*, Selys.

Male and female much alike.

Male: Expanse 64 mm. Length 30 mm. Female: Expanse 54 mm. Length 28 mm.

Head: eyes reddish brown above, paler olivaceous beneath and at the sides; vesicle, frons and upper part of epistome metallic blue green; occiput blackish brown; lower part of epistome, labium and labrum brown.

Prothorax black.

Thorax and abdomen brown with a metallic green lustre. Legs brown.

Wings; both short, the fore narrow, the hind very broad, especially at the anal area; black or blackish brown by transmitted light but reflecting a dark, metallic green. In the male the metallic lustre is general throughout the wing but in the female is most marked at the base, especially in the fore part of loop. The apex of forewing in the male is hyaline, this area being very variable, from a mere spur at the extreme apex, to a wider area extending to within 1 or 2 cells of the stigma and running obliquely outwards and backwards. In the female both wing apices are hyaline, in the fore to just proximal of the stigma and in the hind to 1 cell distal of the stigma, its free border being here deeply concave. In the male, there is often a clearer triangular area just distal of the node more marked in the hindwing than in the fore.

Sexual organs as for the genus.

Hab. Burma, Bengal, Indo-Malay and Indo-China, Borneo.**65. *Rhyothemis triangularis*, Kirby.***Rhyothemis lankana*, Kirby.*Rhyothemis bipartita*, Selys.

Expanse 60 mm. Length 28 mm. Subject to slight variation in size.

Head: eyes reddish brown above, lilaceous at the sides and beneath; vesicle and forehead metallic green; face and labrum yellowish.

Prothorax brown.

Thorax and abdomen blackish with a metallic green lustre. Legs black.

Wings short and broad, the anal field of hindwing very broad. In both sexes hyaline, with the bases of all wings deep black, this part appearing dark metallic blue by reflected light. The hyaline part is suffused with a greyish brown which gradually deepens as traced towards the wing apices. The limits of the black basal marking in the forewing, up to the 2nd antenodal nervure and to the distal or proximal end of trigone; in the hind up to the 3rd antenodal nervure or in some specimens up to as far as the node. The outer border of the marking sharply defined and serrated or notched. The extent of the marking is extremely variable, Ceylon specimens usually being more extensively marked than those from South India. In an average specimen, the black extends to within 1 cell of the

node, 3 cells distal of the trigone and as far as the apex of the loop. Usually there are two, more or less clear, hyaline rays at the base of the hindwing.

Sexual organs as for genus.

Hab. South India, Coorg, Ceylon, Java, Borneo.

Genus—PANTALA.

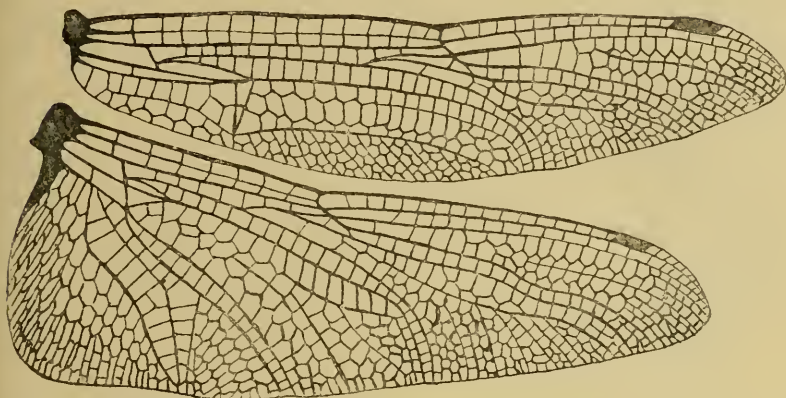


Fig. 53. Wings of *Pantala flavescens* showing neuration.

Genus *Pantala*, Fabr, 1861.

Head large and globular; eyes contiguous for a long distance; suture very deep and separating two flat areas which lie below the forehead, the latter narrow and prominent; vesicle broad and low.

Prothorax with a very small lobe which is almost entirely hidden by the approximation of head and thorax.

Thorax robust, very hairy. Legs slim and long; hind femora with about 25 small, evenly sized spines and some larger, wider-spaced ones in the outer third; mid femora with a row of gradually lengthening, larger spines. Tibial spines very long, moderately robust and numerous. Claw-hooks robust, situated about the middle. Armature of legs very similar in the female.

Abdomen cylindrical and appearing relatively short due to the depth of the hindwing, dilated at the base, constricted at the third segment and then gradually tapering to the end. Supplementary ridges on the 2nd, 3rd, 4th and 5th segments.

Wings long, the fore narrow, the hind very broad; reticulation close; trigone in forewing 2 or 3 cells distal to the line of trigone in hind; sectors of the arc with a moderately long fusion, about equal in the two wings; the arc lying between the 1st and 2nd antenodal nervures; antenodal nervures $13\frac{1}{2}$, the final one incomplete; 1 cubital nervure in the forewing, 2 in the hind, the distal of which lies near the trigone and forms a minute subtrigone; no supplementary nervures to the bridge; trigone in the forewing traversed once, very narrow, the costal side about $\frac{1}{4}$ th the length of distal side, its relation to the hypertrigone a little more than a right angle; trigone in hindwing entire, its base very slightly proximal to the arc; 8th nervure in the hindwing from the anal angle of trigone, in the forewing nearly straight, so that the discoidal field is strongly contracted at the termen; discoidal field begins with 3 rows of cells for 4 or 5 rows and is then continued as rows of 4; 2 rows of cells between 5 and 5a; all hypertrigones entire; 4th nervure strongly undulated; 5th nervure

diverging from the 4th and tending to become lost in the general reticulation a short distance from the termen; the 7th nervure at the distal end of 7a, strongly approximated towards the 6th and bent abruptly towards the termen; loop long and narrow, made up of 2 rows of cells none of which are as a rule divided, its outer angle tending to become obliterated and its midrib to become straightened. The inner border with a strong angle from which a nervure descends and splits the anal area into a distinct outer zone of large cells and an inner one of narrow, elongated ones. Membrane moderately large. Stigma of forewing much larger than that of hind.

Anal appendages very long and slender, in close apposition.

Sexual organs: male: 2nd segment very small, the lamina projecting and deeply fissured so that it appears to be made up of 2 lobes; tentaculæ broad, depressed, the internal directed outwards, the external only present as a rudimentary ridge on the internal; lobe small, oval and depressed.

Female: borders of 8th segment not dilated; no distinct vulvar scale formed on the 8th ventral plate, the free border of which projects as a stunted, tongue-like process; 9th ventral plate short, carinated, near its middle 2 small, horn-like processes similar to those seen in *Rhyothemis*.

Anal appendages in the female as long as those of the male.

66. *Pantala flavescens*, Fabr.

Libellula flavescens, Fabr.

Libellula viridula, Palisot de Beauvais.

Libellula analis, Burm.

Libellula terminalis, Burm.

Male and female very similar. Expanse 85 mm. Length 48 mm.

Head rounded and relatively large; eyes capped with bright red or reddish brown, pale lilac blue at the sides and beneath; vesicle and occiput bright yellow or olivaceous; face and forehead bright yellow, often with a dash of bright red at the upper part of latter; labium and labrum dark yellow.

Prothorax ochreous.

Thorax variable in colour, usually olivaceous or golden brown but sometimes a reddish orange, especially in wet season forms which are more highly coloured. Laterally paler, bluish green or greenish white, no markings.

Abdomen ochreous or yellow, suffused with red along the dorsum and on the dorsum of the 8th, 9th and 10th segments, small black spots. Beneath the first four segments, bluish green or whitish, the remainder dark yellowish brown and all bearing lateral, black "f"-shaped marks.

Superior anal appendages very long, as long as segments 9 and 10, brownish or the basal part yellow.

The female is very similarly coloured but has no red on the face or abdomen and the eyes are olivaceous brown above. The abdomen is stouter and without the constriction at the 3rd segment.

Wings similar in the sexes but the basal spot paler and more diffuse in the female. Hyaline with a pale yellow, basal spot in the hindwing extending as far as the cubital nervure, inner border of the loop but not as a rule to the termen. Very often the apices of the wings are a little smoky. Stigma reddish brown. Membrane white. Legs ochreous streaked with black.

Sexual organs as for genus.

Hab. Throughout India. *P. flavescens* occupies in the dragonfly world the same position, which *Cynthia cardui* occupies in the lepidopterous, it being a very cosmopolitan insect and found throughout the warmer zones of the whole world.

In Indian limits it is usually found to be gregarious and a swarm of a hundred or more may often be seen dancing lazily in the air. They prefer open breezy situations and for no explicable reason, will often choose the

lee-side of a banyan tree bordering a hot, dusty highway. To such situations they appear to migrate from their breeding places which are usually to be found at no great distance off, these being generally shallow swamps or marshes.

Genus—*TRAMEA*.

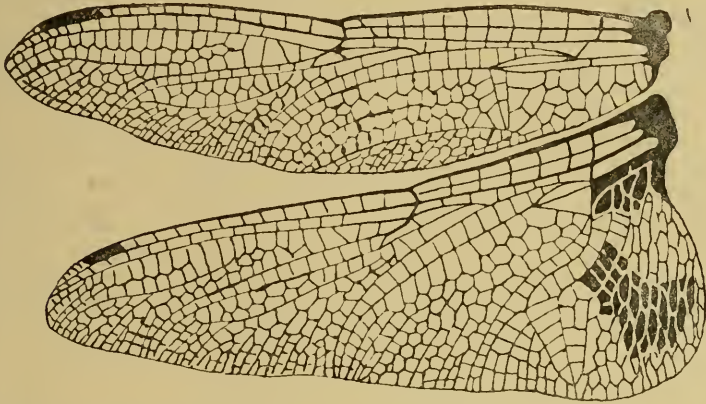


Fig. 54. Wings of *Tramea basilaris* to show neutration.

Genus *Tramea*, Hagen, 1861.

Head very large; eyes contiguous for a long distance, about equal to the length of occiput; vesicle large; forehead broad and prominent, but with no marked foreborder; suture flush.

Prothorax with a very small posterior lobe which is completely hidden beneath the head.

Thorax robust, cubical, very hairy, almost pilose. Legs very long and slim; the hind femora with a row of stout, widely-placed, gradually lengthening spines; mid femora similar; tibial spines robust, numerous; claw-hooks robust, situated near the apex. Armature in the female very similar.

Wings very long, the fore moderately and relatively narrow, the hind broad; reticulation close; trigone in the forewing 3 or 4 cells distal to the line of the trigone in the hind; sectors of arc fused for a long distance in the forewing and running close together for some distance, in the hind a much longer fusion; arc lying between the 1st and 2nd antenodal nervures; antenodal nervures $10\frac{1}{2}$ to $11\frac{1}{2}$, the final incomplete; the distance between the first two antenodals is much greater than the following ones; 8th nervure in the forewing from the anal angle of trigone, very short and only a little convex, its outer end more or less lost in the general reticulation; the discoidal field on account of the shortness of the 8th nervure, but very slightly dilated at the termen, usually parallel-sided throughout its extent, 4 rows of discoidal cells; base of trigone in the hindwing at the arc; only 1 cubital nervure to all wings; no supplementary nervures to the bridge; trigone in the forewing extremely narrow and very long, usually traversed twice; trigone in the hindwing long and narrow, entire; all hypertrigones entire; subtrigone in forewing almost or quite square, with 6 or 7 cells, its outer angle more or less lost; 4th nervure straight, but the outer end bent abruptly towards the termen; 5a strongly concave, with 2 rows of cells between it and 5; a well-marked accessory nervure running, about midway between the 3rd and 4th nervures and parallel to both, but with a concavity towards

the 3rd; loop very long and very narrow, its inner border with an angle very similar to that seen in *Pantala flavescens*, from which a tolerably distinct supplementary sector runs back to split up the anal area into an inner area of narrow, elongated cells arranged in oblique rows and an outer, of rounder, hexagonal cells. Divided cells in all angles of the loop; body of loop narrow and strongly constricted, the toe much elongated. Stigma small, that of the hindwing much smaller than that of the fore. Membrane moderately large.

Abdomen long and narrow, cylindrical, the base tumid, the 3rd and 4th segments markedly constricted, the remainder fusiform in the male, cylindrical in the female.

Anal appendages very long and slender in both sexes.

Sexual organs: male: lamina broad and depressed, the border curling outward a little; internal tentaculæ very robust, long, almost straight hooks, somewhat carrot-shaped; external tentaculæ obsolete; lobe quadrate, strongly arched posterior border.

Female: border of 8th segment not dilated; 8th ventral plate prolonged into a split, vulvar scale; 9th ventral prolonged into a tongue-like process overhanging the 10th and furnished at its middle with two small, horn-like processes similar to those seen in *Pantala*.

KEY TO SPECIES.

- A. Basal marking of hindwing a golden yellow enclosing a dark reddish brown, smaller mark *T. basilaris burmeisteri*
 B. Basal marking of hindwing a blackish brown without any surrounding zone of yellow .. *T. limbata*.

67. *Tramea basilaris burmeisteri*, Kirby.

Libellula chinensis, Burm.

Libellula basilaris, Hagen.

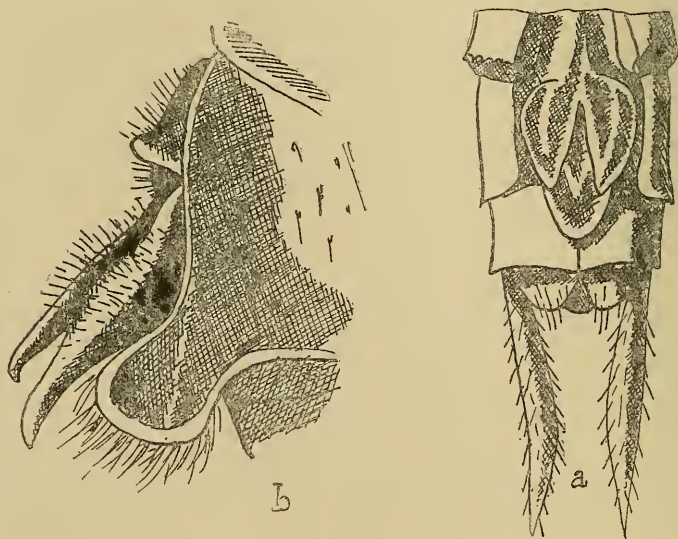


Fig. 55. Sexual organs of *Tramea basilaris burmeisteri*.
 a. Female organs. b. Male organs. (x 12).

Expanse in both sexes 90 mm. Length 50 mm.

Male: head; eyes deep reddish brown above, lilaceous at the sides and beneath; vesicle yellow; occiput olivaceous; forehead brilliant crimson, with a fine, well-defined, black, basal line; bright red above, paler yellow below; labrum yellow; labium brownish.

Prothorax olivaceous yellow.

Thorax ochreous on the dorsum, where it is thickly covered with short, light brown hairs, paler at the sides and a bluish or yellowish green, marked with two oblique, black stripes placed close together and often confluent at their middles. A black humeral stripe often present, incomplete below or connected by a fine black line to the black on the under surface of the fore part of thorax.

Abdomen rust red, with black annules as far as the 6th, at the distal end of each segment. These annules widening laterally and occasionally incomplete on the dorsum; black spots on the dorsal surface of the 7th to 10th segments, each of these bearing a fine, clear white annule at its proximal border. Some specimens especially those caught during the rains, have the abdomen a brilliant red. Legs black, the armature brown.

Wings hyaline. A basal marking in the hindwings, consisting of a golden yellow background in which lie two, dark brown, irregular spots. The yellow area extending as far as the middle of trigone, nearly as far as the 2nd antenodal, as far as the midrib of loop and thence somewhat obliquely to the termen but not reaching the tornus or anal margin. The anterior brown spot begins in the cubital space and extends out to trigone and backwards for about one cell's breadth into loop; the posterior is separated from the anterior by about one cell's breadth and extends obliquely towards the tornus, being a little constricted at its middle. The nervures in this spot are golden yellow and contrast well with the dark ground colour. Antenodal nervures $11\frac{1}{2}$. Membrane white. Stigma mahogany red; that of the hindwing about two-thirds the size of the fore.

Female very similar to the male. Eyes and face without the red, olivaceous or yellowish, the cap of the eyes being brown. Thorax similar to the male. Abdomen, segments 2 to 7 light olive brown, with complete distal, black rings, the remaining segments blackish brown.

Basal marking in hindwing more extensive, the yellow extending as far as the 3rd antenodal and outer end of trigone.

Sexual organs as for genus.

Hab.—Throughout Continental India and extending into Thibet in the North, and to Ceylon southwards. Burma and Indo-Malay. This insect is usually found hovering over tanks in which it breeds or wandering in the near neighbourhood, generally ascending to great heights. On some days, during the rains in Bombay, the air is seen to be full of them, often in company with *pantala* whose flight they rival in gracefulness. I once took a male specimen of this insect about forty miles off the Kathiawar coast on board a liner so that it probably has strong migratory instincts.

68. *Tramea limbata*, race *similata*, Rambur.

Tramea limbata, Kirby.

Libellula limbata, Desjardins.

Libellula incerta, Rambur.

Tramea incerta, Brauer.

Libellula mauriciana, Brauer.

Libellula similata, Rambur.

Tramea similata, Brauer.

Libellula stylata, Rambur.

Tramea stylata, Brauer.

Tramea rosenbergi, Brauer.

Tramea transmarina, Brauer.

Tramea samoensis, Brauer.

Tramea eurybia, Selys.

Tramea euryale, Selys.

Tramea continentalis, Selys.

Tramea limbata continentalis, Ris.

Tramea translucida, Kirby.

Tramea madagascariensis, Kirby.

From the long list of synonyms, it will be seen that *Tramea limbata* is the name applied to a series of insects, differing but slightly and all tending to merge the one into the other. Ris remarks that they are all probably subspecies or varieties of one form and that the Indian representative is a tolerably well defined form, described first from a female specimen under the name of *similata* by Rambur, and later from a male, under the name of *stylata*, by the same odontologist.

Male. Expanse 90 mm. Length 50 mm.

Head: eyes dark brown above, olivaceous at the sides and beneath; vesicle occiput and face dark olivaceous brown; forehead dark, glossy, metallic violet; labrum blackish brown; labium olivaceous brown, with the middle lobe and a stripe on the lateral lobe, black. Some greenish yellow occasionally on the sides of face.

Prothorax brown.

Thorax densely pubescent, dark reddish brown with some obscure dark lines laterally and often some pruinescence beneath. Legs black.

Abdomen deep mahogany brown, the last three segments black. Broad, black annules at the junctions of the segments and the borders often edged with black. Anal appendages very long, black.

Wings hyaline, reticulation black; a basal spot in the hindwing of a deep blackish brown, a ray in the intercostal spaces extending as far as the 1st antenodal nervure and separated from the main larger spot, which extends halfway along the subcostal space, nearly or quite up the trigone in the cubital space, for 1 cell in the base of the loop and from thence in a more or less indented line to the tornus, at which spot only it reaches the termen. In some specimens, there is a very marked indentation where the base of the loop cuts into the marking, so that it appears more or less bilobed.

Stigma reddish brown, the hind about two-thirds the size of the fore.

Membrane pale brown, or grey.

Sexual organs: male: lamina similar to *basilaris*; internal tentaculæ longer and narrower than *basilaris* and the end of hook more bent; lobe long and narrow. Female similar to *basilaris* but the vulvar scale smaller and not obscuring the 9th ventral plate which is longer than in that insect.

Female very similar to the male but paler in colour. A broad, black, basal line to the forehead. The abdomen a dark olivaceous brown or yellow, or in many specimens a reddish brown as far as the 10th segment. Basal marking of hindwing more extensive outwardly but less so posteriorly. Outwardly it extends as far as the trigone or slightly within it and for halfway along the body of the loop internal to the mid rib. Posteriorly it fails to reach the tornus and internally, the anal border, where a small, clear hyaline area is enclosed. (A very small, hyaline area, similar to this is occasionally seen in the male but is absent in all my specimens). Wings decidedly smoky.

Burma specimens differ a little from the above description. The face is a deep red, the forehead a lighter red and with a broad, black, basal band. The basal marking extends rather beyond the 1st antenodal nervure, as far as the arc, to just within the trigone, rather more into the loop and to within 2 or 3 cells of the termen. The hyaline area at the base covers about 12 cells. The colour of the marking is a deep reddish brown.

Hab.—Similar to that of *basilaris* and with similar habits. Cosmopolitan.

Genus HYDROBASILEUS.

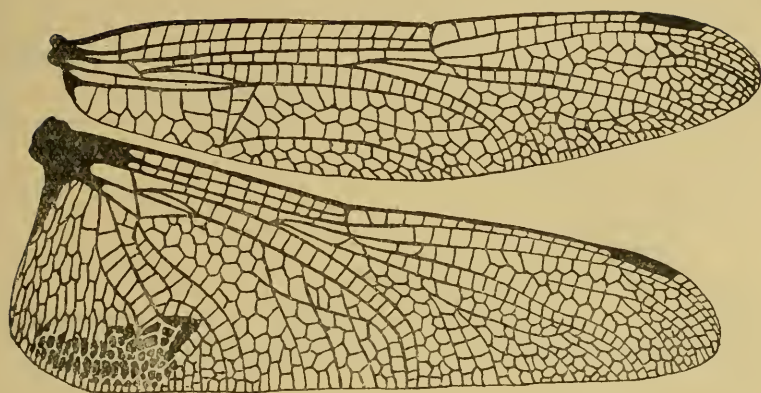


Fig. 57.—Wings of *Hydrobasileus croceus* to show neuration.

Head relatively large; eyes contiguous for a long distance; forehead prominent and rounded; suture deep; vesicle high and deeply notched.

Prothorax with a small lobe which is hidden beneath the head.

Thorax robust. Legs long and slim; hind femora with a row of numerous small but gradually lengthening spines; mid femora with similar spines but less numerous and rather wider spaced; tibial spines fine, short and numerous; claw-hooks very robust, situated about the middle of claws. Armature of the female very similar but the spines rather less numerous and more widely spaced.

Abdomen relatively short, the base dorso-ventrally dilated, the sides much compressed, tapering from the base to the end. A transverse ridge on the 4th segment.

Wings very long and broad; reticulation moderately close; trigone in the forewing about 3 cells distal to the line of the trigone in the hind; sectors of arc in forewing with a short fusion, in the hind a somewhat longer one, the sectors running very close together at their origin; arc lying between the 1st and 2nd antenodals; antenodal nervures $12\frac{1}{2}$ to $18\frac{1}{2}$ the final incomplete, the distance between the 1st two antenodals distinctly longer than that between those following: base of trigone in the hindwing at the arc; 1 cubital nervure to all wings; no supplementary nervures to the bridge; 8th nervure from the anal angle of trigone; trigone in the forewing very long, with a very short costal side, traversed once or twice; trigone in the hindwing longer than usual, entire, the distal side concave; all hypertrigones entire; subtrigone in the forewing variable, with 3 to 8 cells, its outer angle a little obscure and tending to be lost in the general reticulation; 4th nervure strongly undulated; 2 rows of cells between 5 and 5a; 8th nervure in the forewing moderately curved and short; the discoidal field contracted at the end due to an abrupt curving of the 7th nervure towards the termen, the field usually beginning with one or two rows of 4 cells and then continued as rows of 3 cells; the loop with a long body and short toe, its outer angle very obtuse and its inner border often incomplete and lost in the general reticulation so that the loop is open at the apex; a distinct supplementary sector runs from the angulation of the inner border of loop, which splits up the anal area

into an inner area of narrow, elongated cells arranged in transverse rows and an outer of somewhat larger cells. Stigma equal in the two wings, of moderate size. Membrane moderately large.

Sexual organs: male: lamina depressed, its free border turning outward, tentaculæ straight, the point turning a little outwards; lobe short, oval, a little less prominent than the tentaculæ. Female: border of 8th segment not dilated; end of 8th ventral plate prolonged into a deeply cleft vulvar scale; 9th ventral plate carinated at its distal half and bearing two small horny processes similar to those of *tramea*.

Only one Indian species.

69. *Hydrobasileus croceus*, Karsch.

Tramea croceus, Brauer.

Tramea extranea, Hagen.

Hydrobasileus extraneus, Kirby.

Expanse 90 mm. Length 50 mm.

Male: head; eyes reddish brown above, lilaceous or olivaceous at the sides and beneath; vesicle brown; face and forehead ochreous, tinged with red and with a brown, basal line to the latter; labrum yellow.

Prothorax light brown.

Thorax olivaceous or ochreous, paler at the sides where the colour is a whitish green. Legs ochreous or yellow.

Abdomen dark ochreous to reddish brown, the first 4 or 5 segments with the borders finely dark brown and on the 5th to 7th, a brownish, subdorsal stripe. A dorsal band commencing on the 7th which merges into reddish brown on the 8th to 10th segments.

Wings suffused with bright golden yellow, this more intense along the costa of both wings and over the basal area of the hind. The apices often tinted with pale brown, this being more marked in the hindwings. Nervures in the basal part of wing and in the costal fields, bright yellow. The basal marking black and its included nervures a bright yellow; its size and shape somewhat variable, usually beginning at the tornus and running out as far as the apex of the loop where it ascends that structure, being limited outwardly by its outer border. Anteriorly the border of the spot is more or less crenated and runs obliquely from the outer angle of loop to the tornus. Stigma brownish yellow. Antenodal nervures numbering about 17.

Female very similar to the male. The face and forehead olivaceous without any reddish tinge; the thorax similar to the male; the abdomen ochreous, with a reddish tinge and all the sutures, the carina and the lateral borders finely mapped out in black. Wings scarcely differing from those of the male.

Sexual organs. See under genus.

Anal appendages in the female very small, ochreous.

Hab.—Throughout India in the moister zones, Ceylon, Burma, Indo-Malay and Indo-China.

(To be continued.)